

Impact of Improvisation and Utilization of Instructional Materials on Effective Learning of Technical Drawing in Technical and Science Schools

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Abstract: *This study explored the production and utilization of Instructional Materials (IM) by Technical Drawing (TD) teachers for determining the impact which such use has on students attitude towards TD. It also sought to ascertain the degree of competencies by TD teachers for the production and utilization of IM. The study was conducted in Enugu State with TD students and teachers constituting the population. Seven hundred (700) semifinalists TD students and 140 TD teachers participated in the study. A questionnaire was used to elicit information related to the research questions. Data were analysed using mean, standard deviation, frequency and percentage. The results revealed, among other things, that TD students showed positive attitude towards the production and utilization of IM. TD teachers are ready to produce and utilize IM in the classroom. Based on the findings, the implications of the study were X-rayed and recommendations made among which is that TD teachers should involve TD students in the production and utilization of some IM.*

Keywords: Impact, Improvisation, Utilization, Learning Technical Drawing

Introduction

A look is worth a thousand words. This corroborates the Chinese adage that what I hear, I forget, what I see, I remember and what I do, I understand. This is why teaching and learning are supposed to be activities-oriented. This also accounts for the important role of the teacher in facilitating learning through appealing to the sensory stimuli of the learners.

The National Policy on Education (NPE, 2013 Revised) devoted a section of the policy on Education Services which according to the document is meant to facilitate the implementation of educational planning and objectives and promote the efficacy of education. The objectives include among others to enhance teaching and improve the competencies of teachers; to make learning more meaningful for children; to reduce education costs and to develop and promote an effective use of innovative materials in schools.

The policy goes on to specify measures in achieving the above objectives through the establishment of teachers Resource Centres; Educational Resource Centres, Audio-Visual Centres and Science and Mathematics Centres and Workshops. There are clear indications of the Federal Government's recognition of the important roles instructional materials could play in enhancing effective teaching and learning. Ifeakor (2004) stated that the objectives of any educational process determine the contents, methods and materials needed for achieving such objectives the

materials used for enhancing instructional effectiveness are aspects of media employed for achieving the instructional objectives.

Whether they are named educational media, instructional media, curriculum materials, teaching aids and the likes, instructional materials (IM) represent message carriers, a sure dependable media by the teacher for the noble purpose of attaining instructional objectives in teaching learning situations. Thus, educational media is geared towards eliciting desired, behavioural changes in our target audience (Cheta, 2002). Agu (2008) described IM as information carriers designed specially to fulfill objectives in teaching-learning situations. Furthermore, Okeke (2013) noted that IM can be referred to as the wide variety of equipment and materials used for teaching and learning. They include chalkboard, real objects, models, mock-ups, pictures, charts television, slide projectors and other non-projected and projected devices. They now possess high functional values in education and classroom instructions.

The indispensability of IM, for teaching can not be over emphasized. The following claims have therefore been used to support the use of well applied educational aids:

- i. IM supply a concrete basis for conceptual thinking;
- ii. They have a high degree of interest for children;
- iii. They offer a reality of experience which stimulates self-activity on the part of the pupils;
- iv. They develop a continuity of thought;
- v. They supply necessary basis for developmental learning hence make learning more permanent, and
- vi. They provide experience not easily secured by other materials and contribute to the efficiency, depth and variety of learning (Yusa, 2014).

To achieve this laudable importance of IM all hands should be on deck to produce IM in different subjects. Especially in TD To Technical and Science schools TD teachers, an involvement of the TD students would serve even as an inducement for teaching and learning to be student-centred. In the area of production of instructional science materials, apart from the specific practical techniques for producing each of the various types of materials, the following general guidelines can be of help. For instance, it is important to select specific instructional objectives, then identify characteristics of the learner, select content, the appropriate media/instructional materials, determine the cost, design and develop the materials observing closely the rule of clarity, simplicity, accuracy, durability, suitability, size of the class, operating facilities and test the materials for effectiveness.

For utilization, the TD teacher is to be guided by the objectives set; and at what stage the material is to be used-at the beginning of the lesson (introduction), at the presentation stage or at the end of the lesson. For proper utilization, the teacher must make certain preparations to ensure maximum utilization of the IM. To accomplish this, four basic steps are needed: preparation of the teacher-taking care of relevance, accuracy, clarity etc; preparation of the learner i.e class management and briefing on the materials i.e. its readiness; preparation for the follow-up to ascertain the effectiveness of the materials and testing learner either orally or written to ascertain the extent to which learning has been achieved (Ajelabi, 2002).

Empirical studies within and outside Nigeria have established that students achieve greater learning as evidenced in cognitive and psychomotor skills, when IM are used for instructional purposes (Ifeakor, 2004). Studies have also established that students prefer mediated instruction to the prevalent classroom instruction (talk and chalk) in Nigeria school systems (Osa, 2009).

It is also a well-known fact that performance does not only rest on the intellectual skills but on the affective orientation of an individual too. No matter how resourceful a teacher may be, often times, learners decide what and when to learn and according to their interests, needs, abilities and personalities. Students attitude to teaching-learning situation count a lot towards effective learning.

The Oxford Advanced Learners Dictionary of Current English describes attitude as a “way of feeling, thinking or behaving towards somebody/something”. Stressing the importance of attitude, Gank (2008) expressed thus:

Feeling is as real and as important and a part of our human nature as much as is knowing. How a person feels is almost more important to him than what he knows. How he behaves is almost always more important to others than what he knows. (p.38).

One's attitude towards something (a stimulus) is the person's mental disposition that will determine his/her response toward the stimulus to which the attitude is directed (Ayogu, 2002). Attitude therefore can be positive or negative towards the stimulus. In the classroom setting, the production and utilization of instructional materials (IM) as earlier noted (Ajelabi 2000) are potent factors to learning and learning outcomes. Therefore the assessment of Technical and Science schools TD students' attitude towards the production and utilization of instructional materials become a sine quo non in our efforts toward improving learning, learning habits and achievement in TD. Furthermore, attitude had been reported to be positively related to achievement in school subjects (Alao, 1990).

The production and utilization of IM for effective teaching and learning of TD is the target of study presented in this paper. Specifically, the aim of the study was to ascertain the attitude of technical and science schools TD students towards the production and utilization of IM during TD lessons. It should be noted that with the provisions of National Policy on Education (NPE) on IM, adequate care should be taken for the implementation. Furthermore, it sought to ascertain how far TD

teachers are equipped with the competencies for the production and utilization of IM.

Do Technical and Science schools TD teachers possess the skills to produce some IM like models of orthographic projections? How often do they involve students to do so? Are there IM available for teaching and learning of TD if IM are used in the classroom, how do students react to TD learning sessions? These questions present problems that necessitated this study.

Research Questions

The following research questions were addressed in the study.

- (1) To what extent do Technical and Science schools TD teachers produce and utilize instructional materials (IM) in teaching?
- (2) What influence has the production and utilization of IM on technical and Science schools students' attitude to TD?
- (3) How effective is the experience of Technical and Science schools TD teachers in the production and utilization of IM?

Research Method:

Research Design

The descriptive research method of the survey type was adopted. This method is considered appropriate to give adequate description of the production and utilization of IM and the degree of teachers' experience in the use and production of IM.

Area of Study

The study covered all the public Technical and Science schools in Udi, Ezeagu and Enugu Education zones of Enugu State. Udi (32 schools), Ezeagu (49 schools) and Enugu (69 schools).

Population of the study

The target population comprises all TD teachers in 145 schools in the area of the study and all the semi-finalists TD students about 2,200 in the 145 schools.

Sample and Sampling Techniques

Stratified random sampling based on location was used to select 70 schools in the three zones. Simple random sampling was used to select 10 students each from the sampled schools giving a sample size of 700 semifinalist students. Simple random sampling was also used to select 2 TD teachers from the sampled schools giving a sample size of 140 TD teachers.

Instrument

The instrument used for this study was a questionnaire prepared by the researcher. The instrument contained 3 sections A-C. Sections A and B were answered by the students. Section A dealt with information on the production and utilization of instructional materials (IM) by TD teachers, while Section B dealt with the attitude of Technical and Science schools TD students on the production and use of IM. Section C dealt with the TD teachers experience in the use and production of IM and was answered by TD teachers. Sections A and B were structured to elicit the degree of agreement and disagreement with the item statements based on a 4-point scale of strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1, Section C was structured to elicit Yes/No responses.

Validation

The instrument was validated by two TD teachers in Nsukka zone and two lecturers who are of measurement and evaluation experts. Based on their suggestions, the instrument was modified.

Reliability

The questionnaire was administrated to 50 semifinalist students and 28 TD teachers in Nsukka education zone, an area outside the zone. A measure of internal consistency was determined for the three sections using cronbach Alfa method thus Section A= 0.69, Section B = 0.72 and Section C = 0.89. This method was considered appropriate since the items are non-dichotomous.

Method of Data Collection

The administration of the questionnaire was done by the researcher and research assistant who are Technical and Science teachers other than TD – 4 from Udi zone, 4, from Enugu zone and 7 from Ezeagu zone. The choice of research assistants was to facilitate data collection. They were asked to administer and collect back respondents' responses to questionnaire items during their visits on the spot. Through this process, all the administered questionnaire was returned thus ensuring 100% return rate.

Method of Data Analysis

The data obtained from sections A and B were analysed using mean and standard deviation (SD). Based on the 4-point scale of the instrument, a mean of 2.55 and above was an indication of positive attitude for positive statement and an indication of negative attitude for negative statement. On the other hand, a mean of 2.50 and below was an indication of negative attitude for a positive statement and an indication of positive attitude of a negative statement. For section C, data collected were analysed using frequency count and percentage.

Results and discussion:

Table 1: Mean and Standard deviation (SD) on the Production and Utilization of Instructional Materials (IM) by TD Teachers. N = 700

S/N	ITEM	\bar{X}	SD	REMARKS
1	Your TD teacher mentions that some IM can be produced using clay, wood metal machine etc	2.49	0.89	Negative
2	Your TD teacher builds models of the orthographic projections to be taught	2.15	0.98	Negative
3	You have been told to build models or draw a chart in TD	1.99	2.10	Negative
4	Most of the TD lessons are taught with practical demonstration of the concept	2.40	1.98	Positive
5	Available IM in the TD studio are used by your TD teacher to demonstrate the lessons.	2.05	1.03	Positive
6	On some occasions, your TD teacher told you that there are no IM in your school studio.	2.98	1.73	Positive
7	There is no fund to purchase standard IM in the market or materials to produce improved ones.	4.05	2.17	Negative
8	Your TD teacher has never used any IM during his/her lessons.	3.78	2.05	Negative

Table I on the production and utilization of IM by TD teachers as observed by TD students indicated that most TD teachers do not

produce and use IM in teaching. This result of analysis was used to answer research question I. One may conclude from these results that most TD teachers still use the conventional “talk and chalk” method.

Table 2: Mean and standard deviation and Remarks on the Technical and Science schools TD students attitude in respect to each item N=700

S/N	ITEM	\bar{X}	SD	REMARKS
1	Joining in the production of IM supply a concrete basis for conceptual thinking	4.32	1.53	Positive
2	Use of IM motivate, hold and control attention and generate interest in students	3.61	0.85	Positive
3	Encouraging students to learn through the building of models etc is time consuming	2.41	2.21	Negative
4	Production of IM in teaching is stressful	2.09	2.57	Negative
5	Production of IM aids imagination and improves perceptual development	3.85	1.29	Positive
6	Use of IM makes learning more permanent	3.90	0.64	Positive
7	IM are too difficult to source and costly too	1.78	1.16	Negative
8	Use of IM enhances students' participation and stimulates self-activities	4.95	1.54	Positive
9	Production of IM can positively influence students' cooperative learning	3.36	2.07	Positive
10	Utilization of IM can improve achievement and consequently increase enrolment in TD	3.50	1.67	Positive
11	The use of IM would make TD lessons enjoyable.	4.29	0.99	Positive
12	Knowledge acquired through the production and utilization of IM in TD lessons can positively influence students' career choice	3.36	1.10	positive

Table 2 was used to answer research question 2. The mean score of 9 out of 12 items constructed in favour of the production and utilization of IM exceeded 2.55, the base mark for positive attitude for an item. The posture indicates that TD students have positive attitude towards the use and production of IM by TD teachers for instructional purposes. The negative attitude demonstrated in items 3, 4 and 5 simply signifies that TD teachers do not produce and use IM in teaching-learning processes, otherwise some common IM e.g T-squares, orthographic, models sets squares, sectioned objects are not costly and can be sourced. Their practical use in the classroom will convince TD teachers that they will save their time and energy. Some studies (Ayo, Cheta, 2002) reported of non-availability, inaccessibility and non-utilization of IM in schools. The teachers, students and the school authorities can easily source some of the IM for the teaching of Technical and Science schools Technical Drawing.

Table 3: Frequency and Percentage of TD Teachers' Experience in the Production and Utilization of Instructional Materials (IM) N = 140

S/N	ITEM	YES	%	NO	%
1	Do you consider your pre-service and in-service training in the production and utilization of IM adequate?	20	14.3	120	85.7
2	Have you attended any workshop or seminar on the production and use of IM?	18	12.9	113	80.7
3	If yes (to 2) did you benefit through your attendance?	05	27.7	13	72.2
4	Do you make personal effort to develop in IM through reading, discussion or use of audio-visual materials?	105	75.0	35	25
5	Would you be ready to attend an in-service course/training on the use and production of IM	129	92.1	11	7.8
6	Give all the assistance (material resources etc), would you be ready to produce and use IM for instructional purpose?	132	94.3	08	5.7

From the results in Table 3, majority of the TD teachers indicated that their pre-service and in-service training in production and use of IM were inadequate. Specifically, while 14.3% of the teachers considered their training to be adequate, 85.7% of them considered their experience to be inadequate. The responses also indicated that 12.9% of them attended seminar or workshop in IM production and utilization while 80.7% never attended any. Among those who responded positively to the attendance of workshop, 27.7% of them believed they benefited by their attendance, while 72.2% believed they did not benefit. The analysis further revealed that 75.0% of the teachers indicated that they made personal efforts to develop interest in the production and utilization of IM, while 25.0% indicated no interest development. Majority of teachers (92.1%) showed their interest in attending in-service programmes on the use and production of IM. This finding is in line with Ifeoma (2012) in which she noted that “in-service training would help technical teachers to know how to use technical education materials in teaching science subjects to their students in a more effective manner” Finally, 94.3% of TD teachers indicated that with the availability of all resources they would produce and utilize IM for instructional purposes.

Conclusion

This study has demonstrated that most TD teachers do not produce and utilize instructional materials for teaching and learning. It was also revealed that TD students showed positive attitude towards the production and utilization of IM by TD teachers for instructional purposes. Furthermore, TD teachers considered their pre-service training inadequate to meet the challenges related to IM production and utilization and they expressed interest in the area when fully equipped with adequate resources.

Implication of the findings

Based on these findings, the indicated positive attitude by TD students towards the production and utilization of IM implied that:

1. Students are aware that production and utilization of IM would supply them with a concrete basis for conceptual thinking.
2. That with the use of IM, they would improve in TD achievement and their interest would be enhanced.
3. That with the production and utilization of IM, they would make the right career choice.
4. That with the use of IM by their teachers, TD lessons would be enjoyable.
5. On the other hand, TD teachers are aware that with proper in-service training and provision of adequate resources they would be able to produce and utilize IM for instructional purposes.

Recommendations

The researcher recommends that

1. TD teachers should involve TD students in the production of some instructional materials (IM) eg. Models of some organic compounds, diagrams of preparation of gases, the periodic Table etc.
2. TD teachers should be encouraged to break away from the non-chalant attitude of not producing and utilizing available IM in their classrooms.

3. Production and Utilization of IM should be made prominent and integrated into Science Education programmes in teacher training schools like College of Education and Universities.

4. Seminars, workshops and in-service training should be periodically organized for TD teachers and attendance must be mandatory

5. The government federal and state-should be made to understand that it is not enough to establish resource centres, what is important it to make them functional for maximum utilization.

REFERENCES

- i. Agu, (2005). *Fundamentals of Educational Technology*. Enugu K & C publishers
- ii. Ajelabi, A. (2002). *Production and Utilization of Educational Media*. Lagos: Rayfel Communication Ltd.
- iii. Alao, E.O. (2010). A Scale for Measuring Secondary School Students' Attitude Towards Physics. *Journal of Science Teachers Association of Nigeria (STAN)*, 26 (2), 75-79.
- iv. Ayo, A.K. (2012). Attitude of JSS Teachers towards the use of Mass Media. *Journal of the World Council for Curriculum and Instruction (WCCI) Nigeria Chapter*, 34 (1), 45-53.
- v. Benedict, (1994). Effects of Two Types of Media Presentation on the Cognitive and Psychomotor Performance of Fine Art Students. *Journal of Professional Educator*, 3, 95-103.
- vi. Carter, A. & Schmidt, K.C. (1985). An Assessment of the Production and Utilization of Instructional Media by Student Teachers. *Educational Technology*, 25(2), 30-32.
- vii. Cheta, W. (2002). Instructional Materials: improvisation and Adaptation in the study of Business Studies. *The Nigerian Academic Form: A Multidisciplinary Journal*, 3 (1), 188-193.
- viii. Federal Republic of Nigeria (2013). *National Policy on Education (Revised)*. Yaba: National Educational Research and Development Council (NERDC) Press.
- ix. Gank, B.A. (2008). Inculcating Scientific Attitude in Learners A strategy for Effective STM Communication 39th Annual Conference Proceedings of Stan, 358-361.
- x. Ifeoma, U.K. (2013). Information and Communication Technology (ICT) – Based Innovations in Training and Development for In-service Science Teachers. In A.O. Abolade (Ed) *Forty years of Educational Technology in Nigeria. A publication of Nigeria Association for Educational Media and Technology (NAEMT)*, 2,272-283.
- xi. Ifeakor, A.C. (2004). The Use of Instructional Materials in Science Pedagogy. *The Nigerian Academic Form A Multidisciplinary Journal*, 6 (4), 61-66
- xii. Mogbo, J.O. (1994). Analysis of Laboratory Infrastructural Facilities and Fittings for the Teaching and Learning of Secondary School Chemistry. *Journal of Quality Educational*, 1, 122-133.
- xiii. Okeke, R.J. (2013). Principles of Development, Selection, Utilization, Evaluation, Storage and Retrieval of Instructional Materials. In F.A. Okwo and G.A. Ike (Eds.) *Education Technology: Basic Concepts and Issues*. Nsukka. University Trust Publisher.
- xiv. Okoh, F.A. (2015). Communicating STM with New Media: Status and Implications. *Annual Conference Proceedings of STAN*,
- xv. Osa, I.K. (2009). The Effect of Videotape recording (VTR) Presentation of Student Teacher's Attitude. *Nigeria Journal of Technical Education*, 7(10), 72-79.
- xvi. Peterson, D. and Webb, C.D. (1988). The effect of Video –assisted Instruction on Students' Achievement and Attitude in First Grade Mathematics. *Educational Technology*, 28 (1), 49-53.
- xvii. Oluka, A.A. (2015). Media Selection and Utilization for successful Classroom Interaction: A front-End Analysis. *African Journal of Educational Technology*, 5 (1), 120-123.
- xviii. Yusa, A.K. (2014). Strategies for production and Utilization of Improvised Instructional Secondary Schools. 39th Annual Conference Proceedings of STAN, 83-86.